REMARKS

Claims 1-72 are pending.

Claims 1-72 are rejected.

In the final office action dated May 2, 2008, claims 1-72 are rejected under 35 USC §102(b) as being unpatentable over Pado U.S. Patent No. 6,185,470.

On 22 July 2008, applicant's attorney Hugh Gortler faxed a proposed response to Examiner Joseph Hirl. On July 30, during a very brief telecom, Examiner Hirl indicated that he would not be able to review the proposed response by August 1. Examiner Hirl also indicated that he would not withdraw the finality of the rejection.

The amendments above are almost identical to those presented in the proposed response. Claims 1-14, 17-19 and 23-72 have been cancelled, claims 73-82 are new, and claims 15-16 and 20-21 have been amended to depend from new claim 73. Claims 15-16, 20-21 and 73-82 are believed to be allowable over the '470 patent.

The '470 patent discloses a neural predictive control system for a plant. The control system includes a neural network for predicting a state of the plant and a cost function for generating a control signal for controlling the plant. The cost function generates the control signal from parameters including the state predicted by the neural network.

During design of the control system in the '470 patent, the plant is used to generate training data for the neural network. The training data includes responses of the plant to different values of the control signal. As but one example, the plant may be an aircraft component having a control surface (e.g., a wing having an aileron). The control surface is moved in response to a control signal u(n) and a sensor on the

component measures position and velocity. The sensor provides feedback y(n) about the component's state in response to the control signal u(n).

The neural network in the '470 patent is trained on the training data so it can predict the state of the plant in response to different values of the control signal. According to col. 5, lines 17-25 of the '470 patent, the training includes comparing predicted output $y_p(n)$ to actual (sensed) output y(n) of the plant. Thus, the plant is used to train the neural network.

The cost function receives a reference trajectory $y_d(n)$. The reference trajectory $y_d(n)$ represents a desired future output of the plant. The cost function evaluates "the predicted performance of the trial input value to achieve the desired reference trajectory" (col. 5, lines 30-33). An example of a cost function is provided at col. 5, line 44. For example, a reference trajectory of $y_d = 0$ might mean that full wing flutter (vibration) suppression is desired. The cost function will determine whether the control signal will meet that desired output. Different trial values are evaluated, and the trial value having the lowest cost is selected.

This example of the cost function has several cost function parameters, which have to be determined during design. During design, it is desirable to test the control system for different values of the parameters.

According to col. 6, lines 17-24, different permutations of cost function parameters (the "control horizon") are presented to the neural network, and one of the permutations is selected. This is one way of tuning the control function is tuned. Figure 1 and col. 6, lines 32+ of the '470 patent suggests that the plant is used to provide feedback while the tuning is being performed.

However, using the plant to tune the cost function has certain drawbacks. These drawbacks include manually tuning of the control system, and risking possible damage to the plant.

Manual tuning of the control system is very time consuming and labor intensive. The manual tuning described in the ‘470 patent is labor intensive because the plant is controlled and its responses are measured for each permutation of cost function parameters. There could be thousands of permutations, taking hours or even days to evaluate.

The method of claim 1 overcomes these drawbacks. The method of claim 1 includes measuring the response of a plant to a single input signal. Then, the plant is taken off line, and the signal is supplied to the neural network based control system. Phases of the previously measured responses of the plant (measured while it was still on-line) to the input are compared to a phases of control responses u(n) at corresponding frequencies.

In the method of the ‘470 patent, the plant is controlled and its responses measured for each permutation of cost function parameters. In the method of claim 1, the plant is controlled and its responses may be measured only once. The recorded plant responses may be compared to each of thousands of different permutations to find a “viable permutation.” A processor could make each comparison for each permutation in one second or less. In this manner, the method of claim 1 greatly reduces time and cost of tuning the cost function.

Moreover, the method of claim 73 does not subject the plant to permutations that could damage the plant. The plant is off-line while the permutations are being tested.

Thus, the ‘470 patent does not teach or suggest the method of base claim 73. Therefore, base claim_73 and its dependent claims 15-16, 20-21 and 73-80 should be allowed over the ‘470 patent. Base claims 81 and 82 should be allowed for the same reasons.

If the Examiner has any questions or wishes to further discuss this application, he is encouraged to contact the undersigned.

Respectfully submitted,

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